

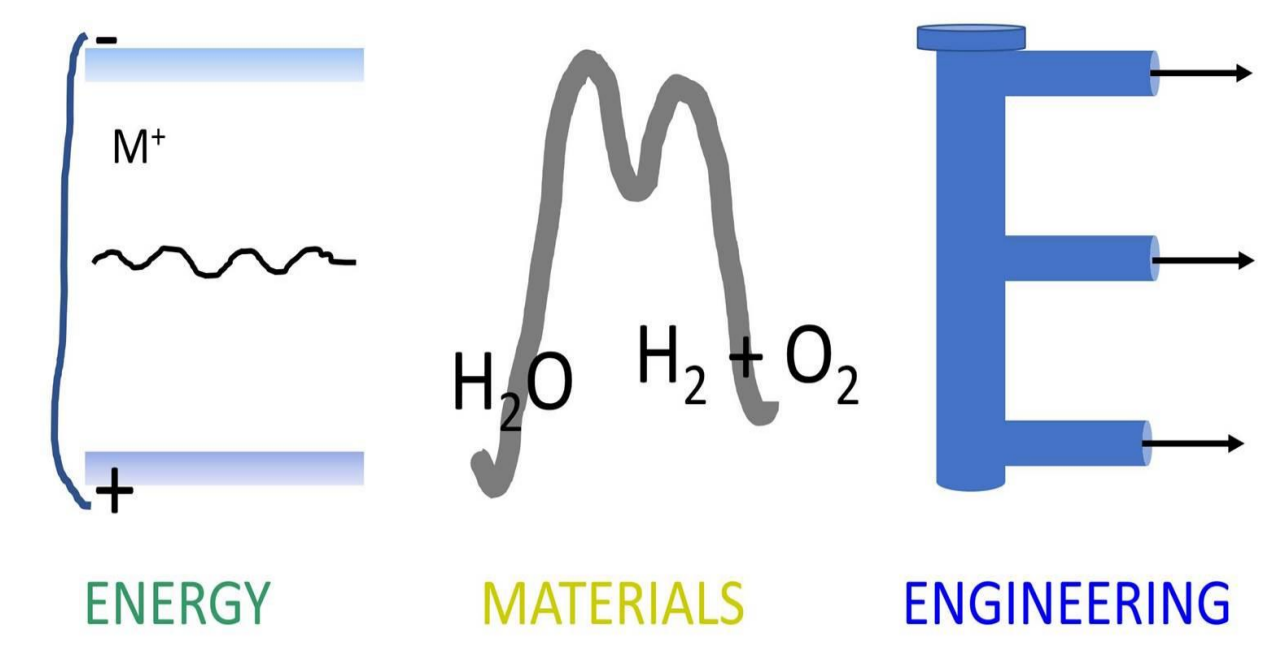


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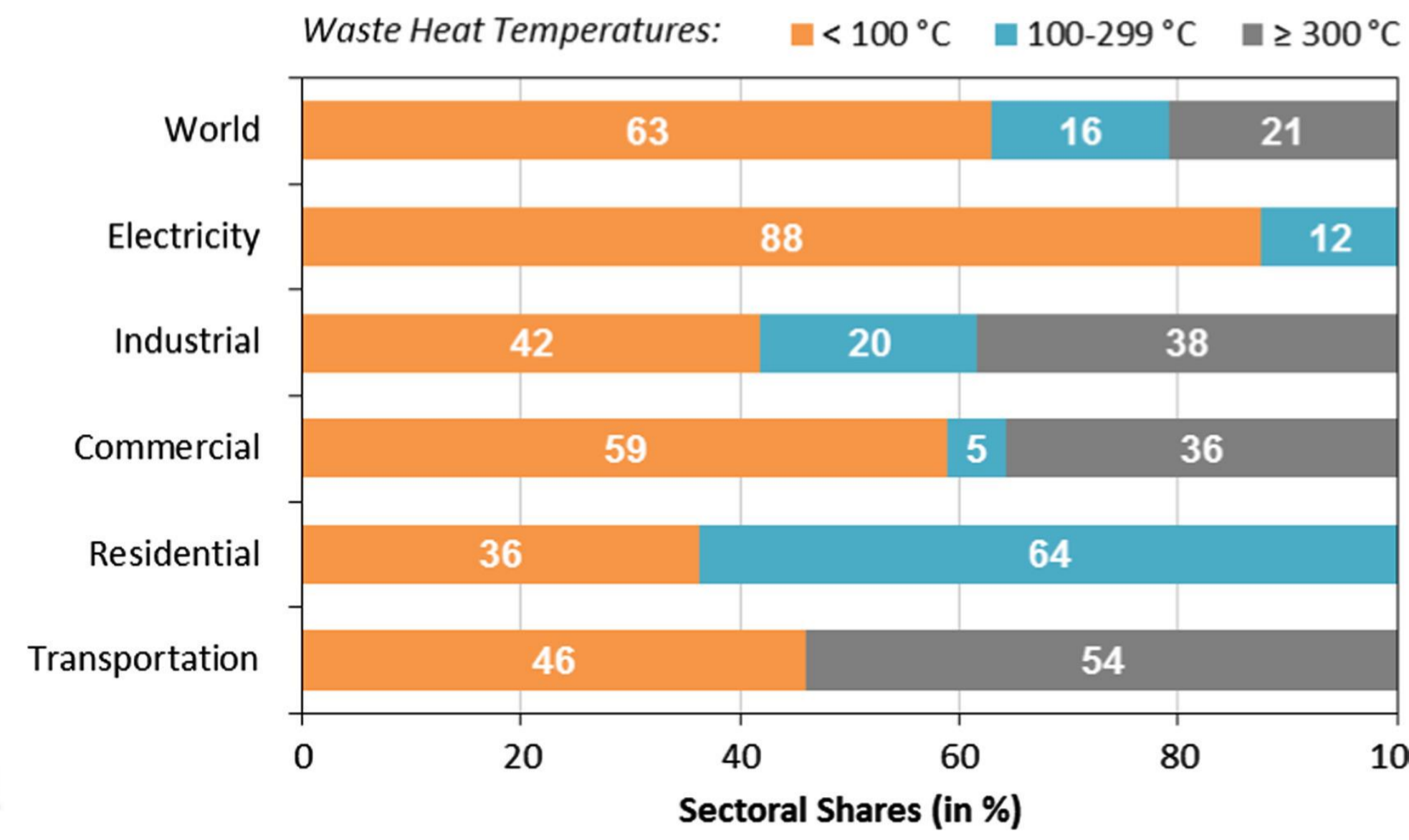
# Pyroelectric Materials for Energy Harvesting

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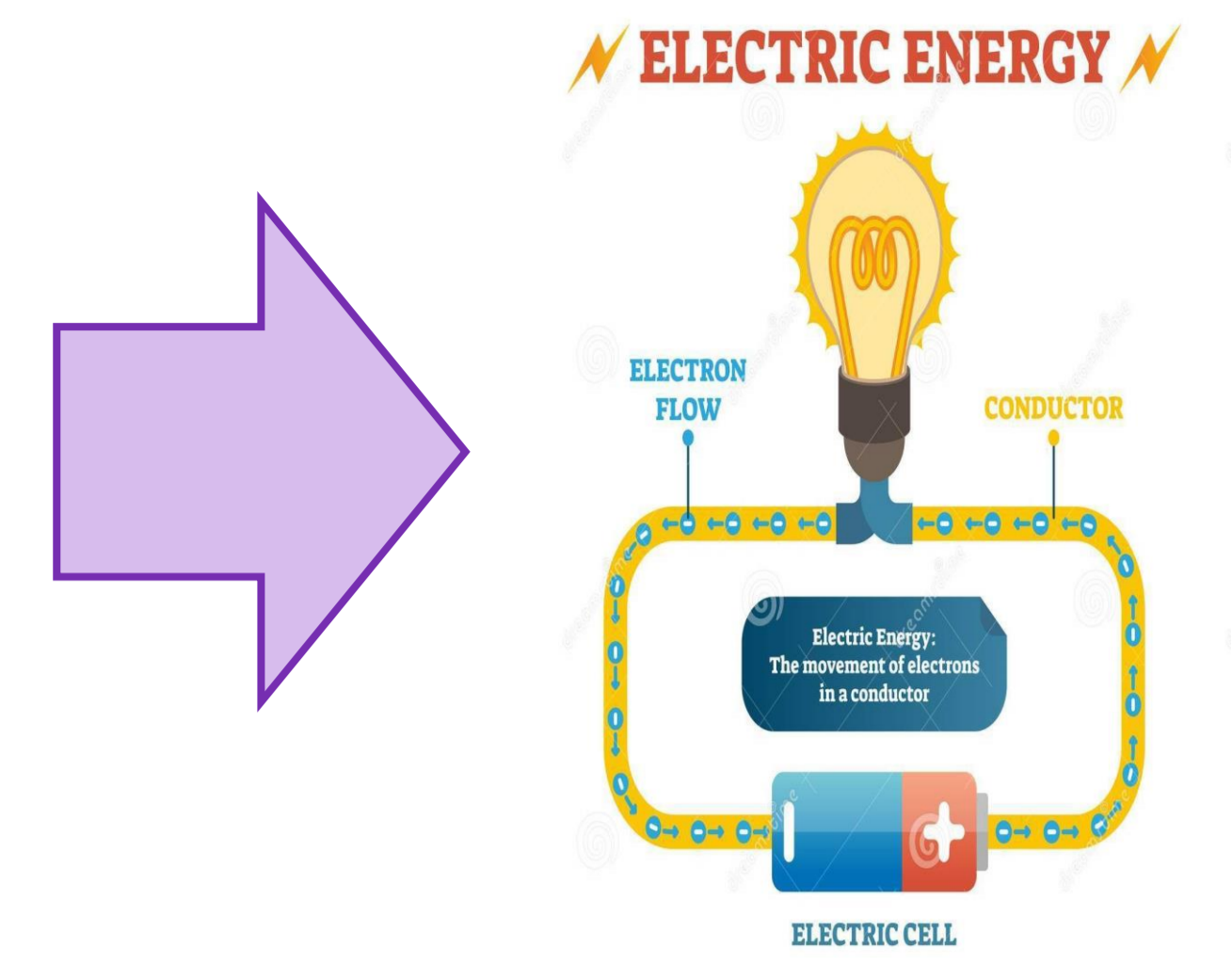
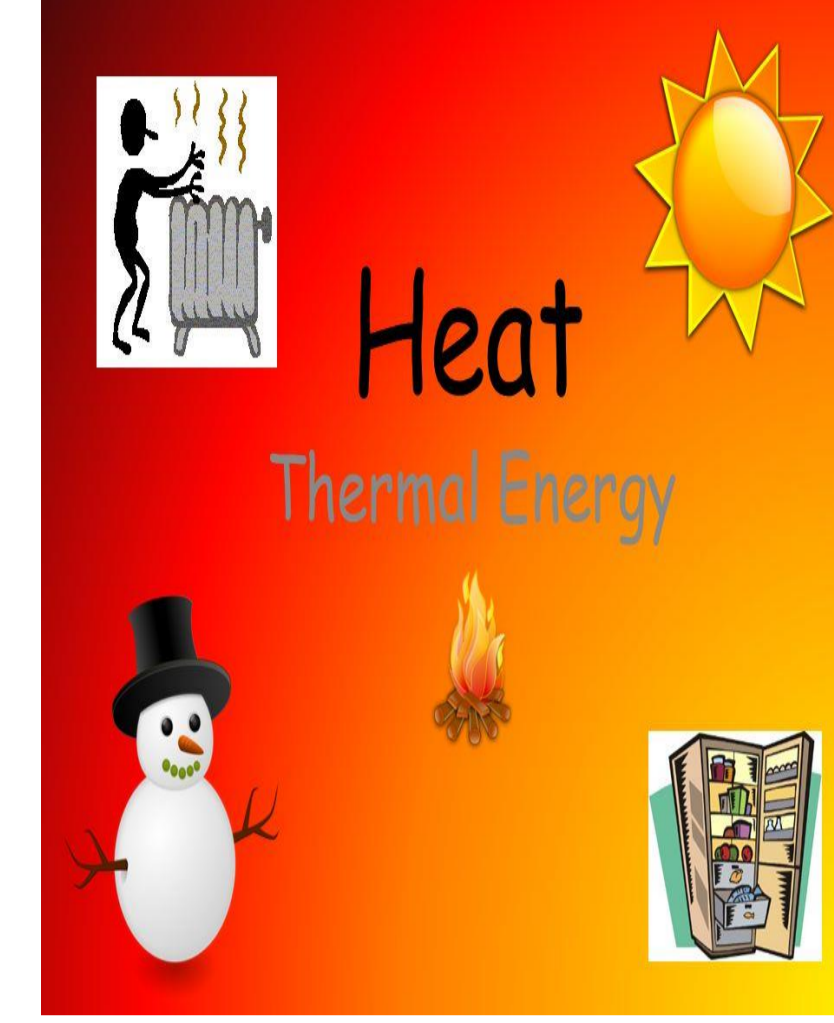
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## Introduction



## Why Pyroelectric Materials ?



## Research Aim

➤ To use **low-grade heat waste energy** < 100°C to drive **electrocatalysis** by using pyroelectric materials.

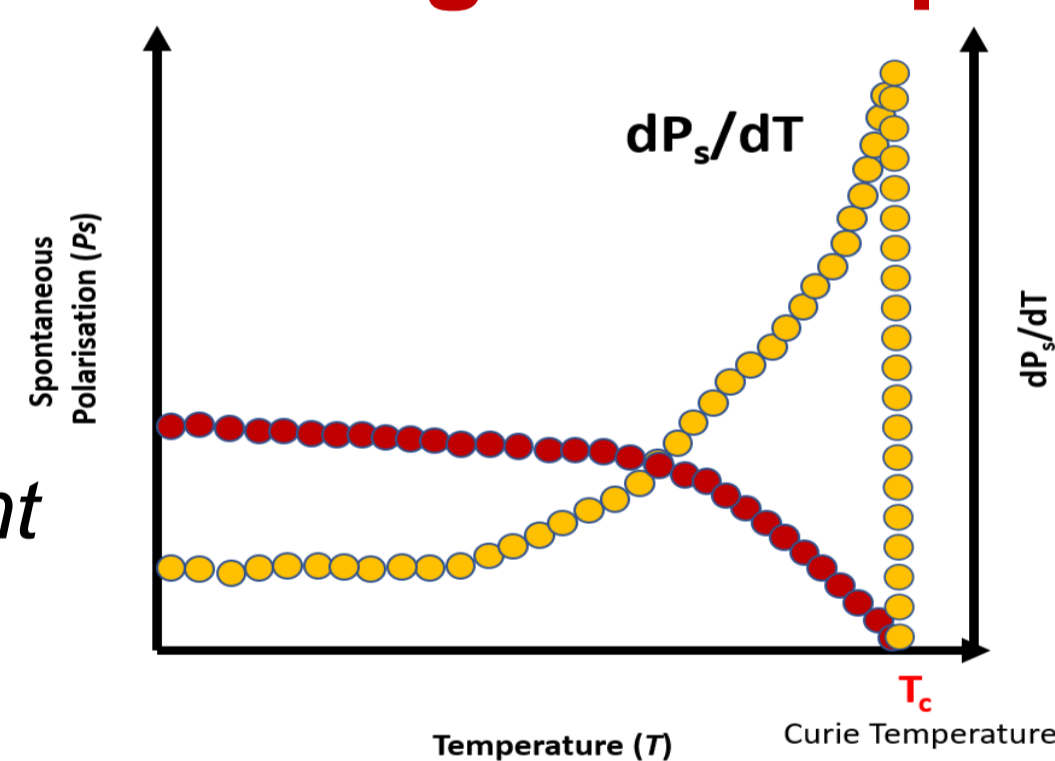
- (i) to produce H<sub>2</sub>
- (ii) to reduce CO<sub>2</sub> to get value-added products such as methane (CH<sub>4</sub>), methanol (CH<sub>3</sub>OH) and C<sub>2</sub> & C<sub>3</sub> hydrocarbons

## Research Objective

- ❖ In order to get better efficiency we need to focus on the pyroelectric materials characteristics.
- To **develop high surface area (A)** for maximize the surface charges
- To **increase pyroelectric co-efficient** ( $\rho$ ,  $dP_s/dT$ ) by thermal cycling near curie temperature ( $T_c$ )
- To **increase rate of change of temperature** ( $\Delta T$ ,  $dT/dt$ )

$$I_p = \rho * A * \Delta T$$

$I_p$  - Pyroelectric current



## Conclusions

➤ This research project will focus on using a renewable energy source (low waste heat energy) to generate electrical energy to drive the chemical reactions. This will provide a new tool to combat environmental issues and climate change.



## Acknowledgement

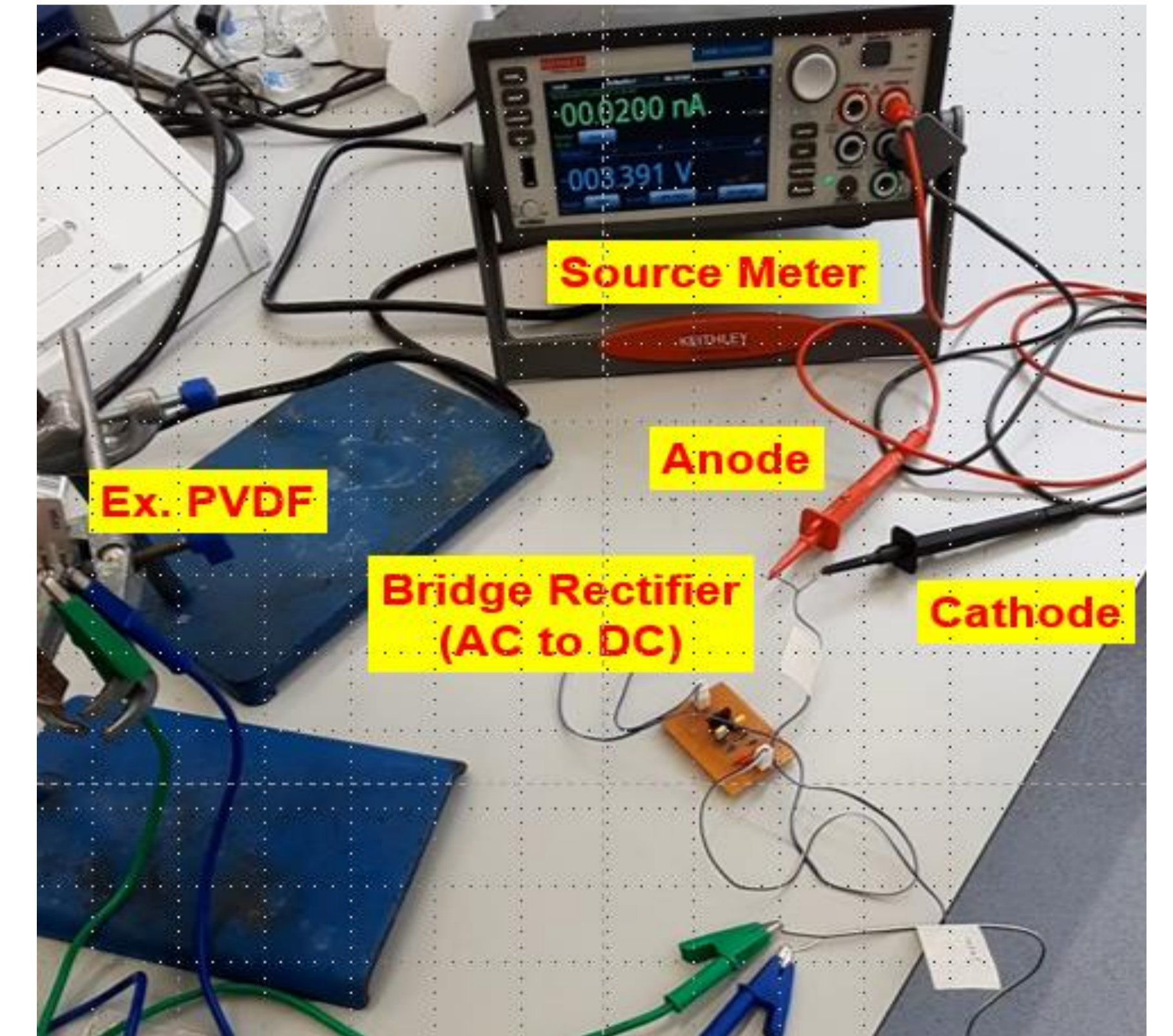
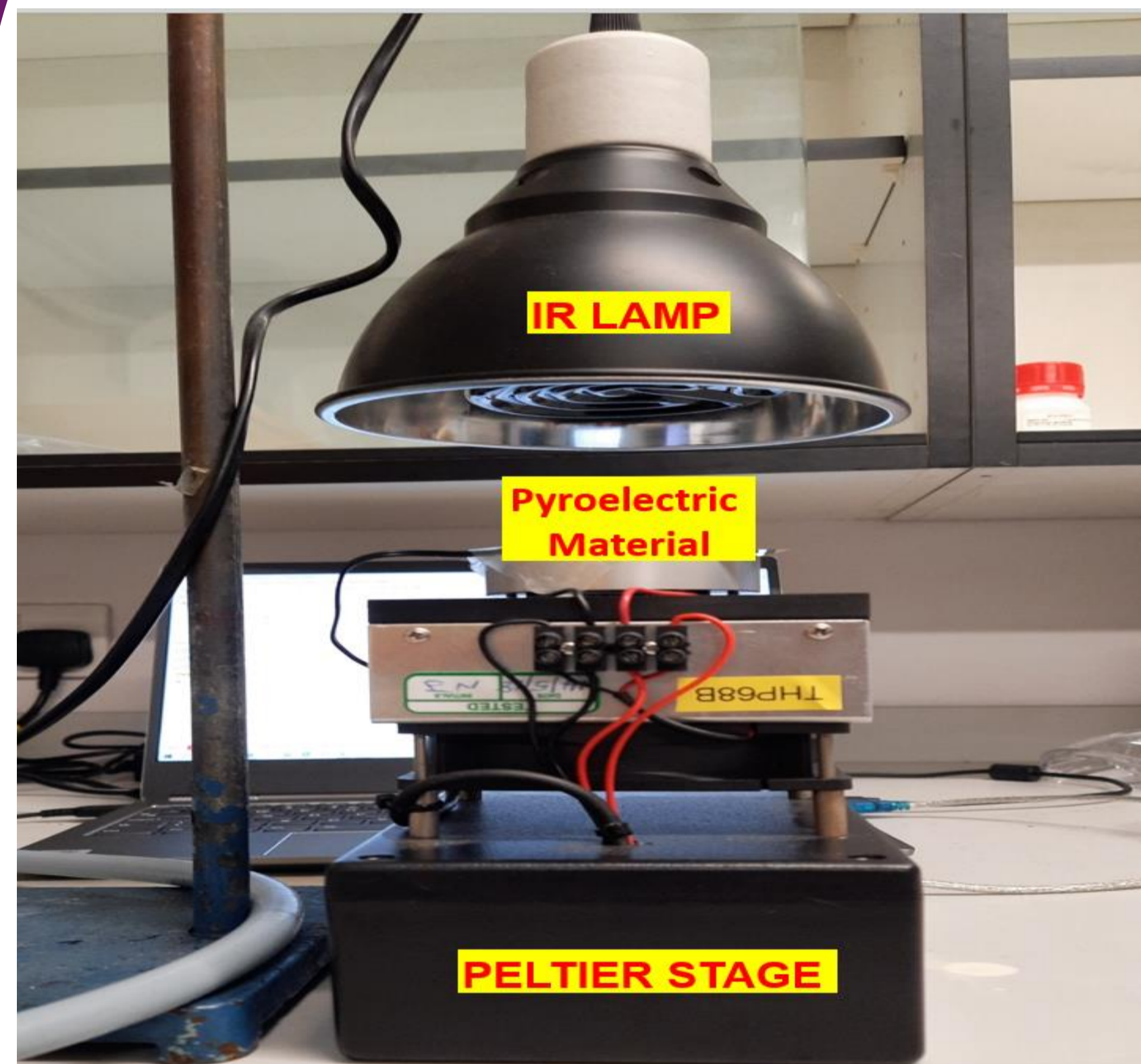
We would like to thank School of Engineering, London South Bank University for research funding.



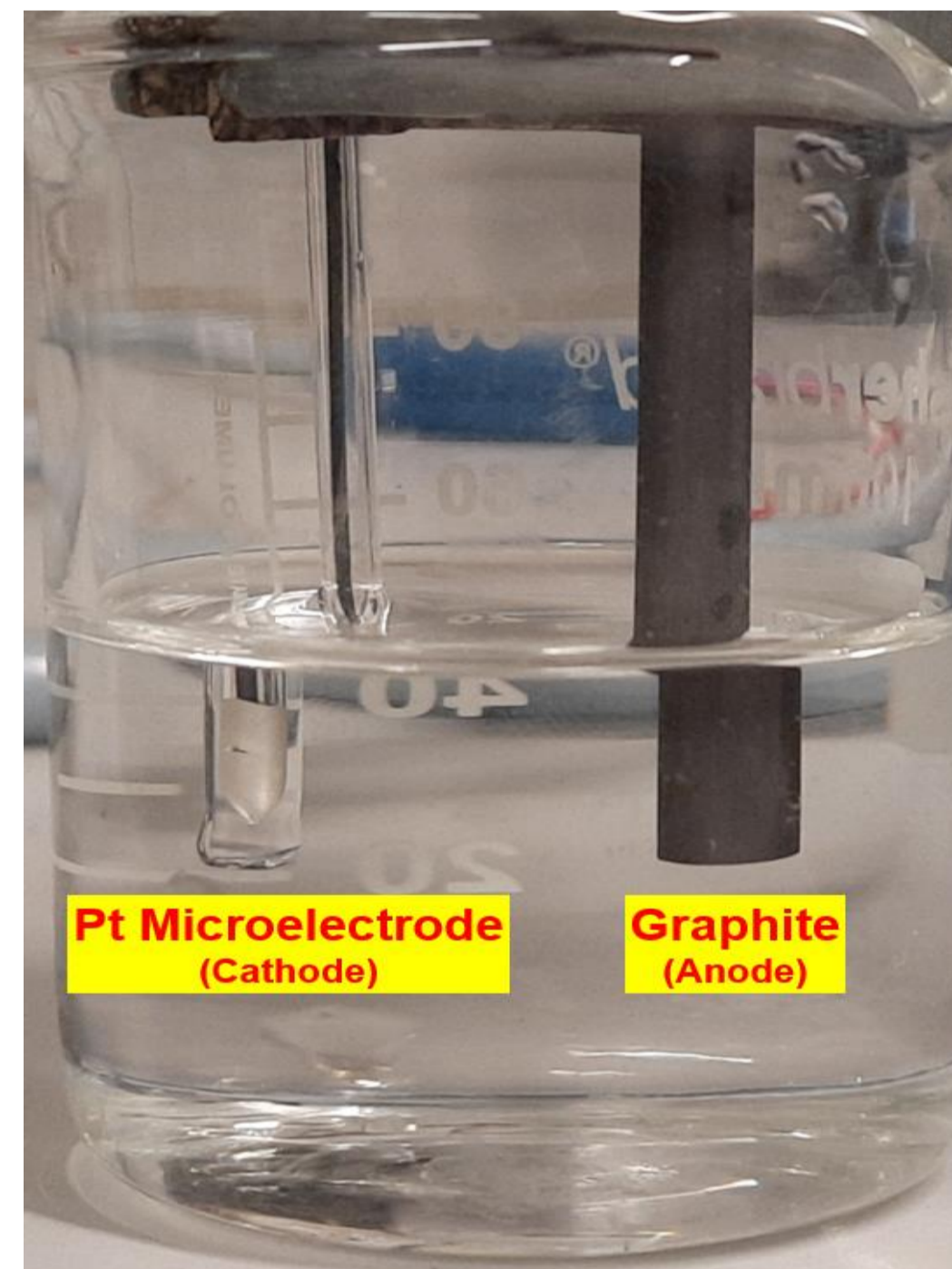
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## Materials & Methods

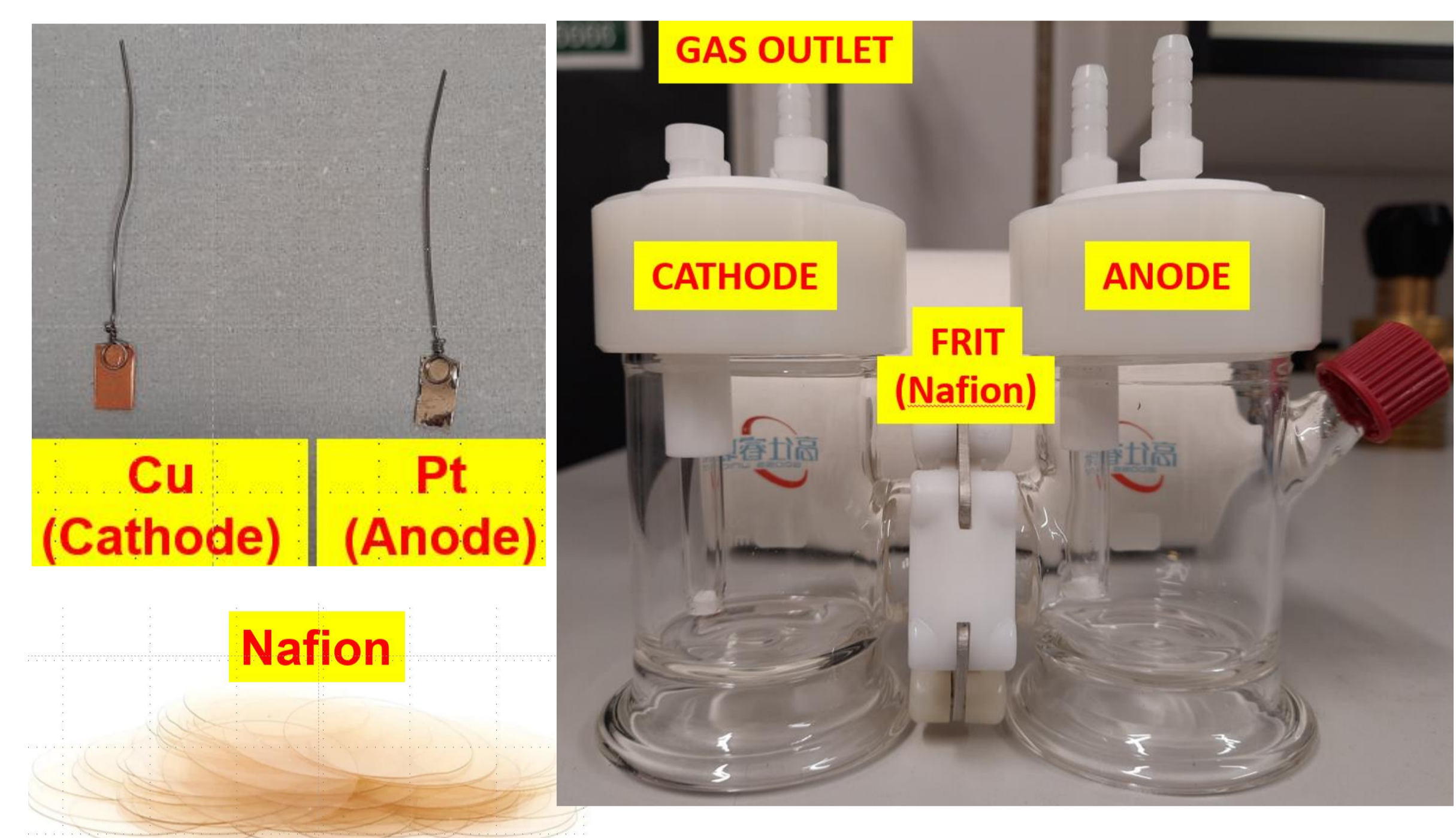
➤ **Lead-free** pyroelectric material - Ba<sub>x</sub>Sr<sub>1-x</sub>TiO<sub>3</sub> (BST)



## H<sub>2</sub> Generation



## CO<sub>2</sub> Reduction



## References

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